

generic prior art system shown by Applicants in Fig. 4B is closer to the instant invention than Steudel.

Similarly, the prior art antenna shown in Fig. 4B is closer to the instant invention than either Torby or Grabowski. Torby shows a set of end-firing radiators that have a different angular relationship to one another and to the boresight than do the elements of the present invention. Both his upper pair (1 and 2) and lower pair (3 and 4) are separately symmetric with respect to line 6. In the present invention, the lower half of the array (17 in Fig. 1) and the upper half (16 in Fig. 1) are not separately symmetric with respect to the boresight.

Grabowski shows a set of horns, not a horizontal row of radiators. His supplementary horns 16 and 17 are both on the same side of the main horn 15 and the axes of their main lobes converge toward the axis of horn 15 (Column 4, lines 6-11). Needless to say, the physical differences of Torby's and Grabowski's antennas result in different lobe patterns. It is most definitely not obvious to substitute antennas having different properties for one another because an antenna optimized for one system won't meet the requirements of another system.

The preamble of claim 6 is meant to correspond to a hypothetical system having an antenna sketched in Fig. 9A, in which two planar radiator arrays 16 and 17 are separated by a

sharp transition. Applicants are not aware of such a device in the prior art, but the claimed invention is an improvement with respect to such a device.

New claim 6 is meant to cover both the embodiment of Fig. 1, in which the horizontal rows of radiative elements form a non-planar array having a smoothly varying contour and the embodiment of Fig. 2, in which the horizontal rows 37 form a planar array and the smooth variation in sensitivity direction (the axis of the main lobe) is effected by the standard technique of imposing a phase gradient between elements 41 within the row. Claims 7 and 8 are directed at the non-planar and planar embodiments respectively.

Claim 9 and 10 are directed at a further aspect of the invention that was not stressed in the parent case. In the prior art, two sets of phase elements were required to derive the elevation and azimuthal difference signals while still maintaining a desired lobe pattern (sketched in Fig. 4B and discussed from page 8, line 32 to page 9, line 14 of the specification.) With the present invention, the desired information may be obtained with only a single set of phase shifters, one per row.

An important advantage of warping the effective "angles" of the intermediate rows in a relatively smooth fashion of Fig. 6 is shown in Figs 7 and 8, where the preferred embodiment of

Fig. 6 is compared with no warp (Fig. 7) or with an abrupt change in angle (Fig. 8).

The "warping" of the antenna array may be done physically, which is simple and economical, or it may be done by electrical means as discussed on page 11, line 16, page 12, line 27.

For the foregoing reasons, it is submitted that claims 6-10 are patentable and allowance thereof is respectfully solicited.

Respectfully submitted,

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